# The taxonomic status of the bird of paradise *Paradigalla carunculata intermedia* (Paradisaeidae) with notes on the other *Paradigalla* taxa

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By convention, the bird of paradise genus *Paradigalla* (Paradisaeidae) comprises two species, the Long-tailed Paradigalla *P. carunculata* and the Short-tailed Paradigalla *P. brevicauda* (Mayr 1962, Gilliard 1969, Cooper & Forshaw 1977). They are medium-sized (38 and 23 cm long respectively), sexually monomorphic members of the subfamily Paradisaeinae (typical birds of paradise). Adults are jet-black over the entire body with strongly iridescent blue-green scale-like crown feathering and a subtle deep green sheen to the leading edge of primaries and to dense velvet-like mantle feathering. The face is conspicuously adorned with a yellow wattle that covers the lores and forehead and a bulbous blue wattle at the base of the lower mandible. These wattles are fully developed in *P. brevicauda* hatchlings, but both are dirty cream-yellow with a smudged greyish lower border to the lower mandible wattle. In much longer and acuminately-tailed adult *P. carunculata* there is an additional small bare area directly beneath the blue wattle that is pigmented deep orange-red; these characters, including the long tail, distinguish this species from smaller, truncately-tailed, *P. brevicauda*. For more detailed plumage descriptions see Gilliard (1969), Cooper & Forshaw (1977) and Beehler *et al.* (1986).

The paradigallas occur in montane forests in New Guinea between approximately 1400 and 2100 m asl. They are little known; an exception is a study of the nesting biology of *P. brevicauda* showing that only a single, presumed female, parent attended the nest (Frith & Frith 1992). This finding suggests that males are promiscuous as in most bird of paradise species.

The long-tailed *P. carunculata* was described by Lesson (1835) from a specimen of unknown location. All subsequent specimens of known origin are from the Arfak Mountains in the Vogelkop which is now accepted as the type locality of the species (Mayr 1941, 1962, Gilliard 1969). A single early mounted specimen in the Muséum National d'Histoire Naturelle, Paris, labelled as from Amberbaki (north of the Arfak Mountains, to the south of the Tamrau Mountains), was probably purchased there from local people and was not at its place of origin. Ripley (in Mayr & Meyer de Schauensee 1939) and Gilliard (in Gilliard & LeCroy 1970) did not record *P. carunculata* on the Tamrau Mountains of the Vogelkop. Rothschild & Hartert (1911) described short-tailed *P. brevicauda* from an adult male collected on Mt. Goliath, Oranje Range (eastern Irian Jaya) by A. S. Meek. This simple pattern of allopatry was, however, complicated by Ogilvie-Grant's (1913, 1915)

description of a supposed intermediate species *P. intermedia* from the Utakwa River, below Mt. Carstensz, Snow Mountains, at the western end of the central cordillera. "*P. intermedia*" was established on three specimens, consisting of the type, a subadult male (its only adult plumage being the central pair of jet-black tail feathers), an immature male and a nestling (with nest; see Frith 1970). The characters said to distinguish *P. intermedia* were that it resembled *P. carunculata* but was smaller with a shorter tail, and its wattles were all lemon-yellow (without blue or orange-red). Since then only one other individual bird has been attributed to *intermedia*, this being described as an adult male from the Ilaga Valley, Irian Jaya, collected by Ripley (1964).

While almost all subsequent authors accepted *intermedia* without question as a valid taxon, its position within *Paradigalla* has proved contentious. Most authors agree that *intermedia* does not constitute a valid species but disagree as to which of *P. carunculata* and *P. brevicauda* it belongs subspecifically. Notable exceptions were Rothschild (1921), Mathews (1930), Junge (1939) and Mayr (1941) who considered *intermedia* invalid at any level, and treated it as a synonym of *P. brevicauda*. Gyldenstolpe (1955) found that the material he examined was inadequate for decision. Mayr (1941) tentatively considered *P. brevicauda* conspecific with *P. carunculata*, and this treatment was followed by Mayr & Gilliard (1954) and Gyldenstolpe (1955). Iredale (1950), Mayr (1962), Frith (1970) and Frith & Frith (1992) treated *intermedia* as a subspecies of *P. brevicauda*, while Rothschild (1931), Ripley (1964), Rand & Gilliard (1967) and Cooper & Forshaw (1977) kept it subspecifically under *carunculata*. While acknowledging *P. c. intermedia* as valid Gilliard (1969) inexplicably detailed the nest and nestling collected at the type locality under his account of *P. brevicauda*.

With the statement that males and females (although no female specimen exists) have a "moderately long tail; male with large wattle at the base up the upper mandible and forehead and at the base of the lower mandible lemon-yellow", *P. intermedia* was resurrected as a full species by Cracraft (1992) "based on differences in wattle color (e.g. Ogilvie-Grant, 1915: 26; Ripley, 1964: 48)".

Two individual paradigallas recently sighted to the south, in the Fakfak Mountains, Bombarai Peninsula, Irian Jaya are described as having pale yellow facial wattles and swollen pale blue lower mandible wattles but without orange-red beneath them, and as having relatively short and square-tipped tails (Gibbs 1994).

No attempt has ever been made to review available series of *Paradigalla* specimens comprehensively with the aim of resolving the status and distribution of component taxa. This study seeks to redress this situation by using external morphology, biometrical data, and zoogeographical patterns.

## Methods

All skins of *Paradigalla* spp. were examined in most major museum collections world-wide; and CBF measured as many as possible of each sex and age class of specimens with a recorded locality. Wing length

was taken as the flattened and straightened, thus maximised, chord, using a stopped steel rule. The length of the central pair of, and also that of the remainder of, tail feathers was measured with a small steel rule from the point of entry of the central pair into the bird's skin to the tip of the longest central and remaining feathers. Bill length was measured from the bill-tip to the cranio-facial hinge which in *Paradigalla* spp. is markedly high on the forehead toward the level of the anterior edge of the eye. Bill width was measured at the anterior edge of the nostril. Tarsus length was that of the tarsometatarsal bone. All wing and tail measurements were made with the same rules and all others with the same electrical digital calipers.

Of the two taxa that we recognise herein, 50 specimens of *P. carunculata* and 101 of *P. brevicauda* were examined, and most measured, at the following institutions: American Museum of Natural History, New York (7/51), Rijksmuseum van Natuurlijke Historie, Leiden (4/15), Muséum National d'Histoire Naturelle, Paris (16/0), British Museum of Natural History (5/6), Zoologisches Museum, Berlin (3/4), Australian Museum, Sydney (0/5), Royal Ontario Museum, Toronto (1/4), Staatliches Museum für Naturkunde, Stuttgart (4/0), Naturmuseum Senckenberg, Frankfurt (3/1), Zoological Museum, Bogor (0/3), Naturhistoriska Riksmuseet, Stockholm (0/3), Field Museum of Natural History, Chicago (1/2), Australian National Wildlife Collection, CSIRO, Canberra (1/1), Zoologisches Museum, Hamburg (0/2), Peabody Museum, Yale University, New Haven (2/0), Museum of Comparative Zoology, Berkeley (0/2), Museum Koenig, Bonn (1/0), Zoologisk Museum, København (1/0), Liverpool Museum and Art Gallery, Liverpool (1/0), Staatliches Museum für Tierkunde, Dresden (0/1), Papua New Guinea National Museum & Art Gallery, Port Moresby (0/1).

Adult male paradigallas acquire a deep jet-black plumage with areas of rich iridescence and velvety sheens and as such are easy to identify in the hand, as are subadult males which show some of this feathering appearing within the duller plumage of immaturity. Adult females do not become as jet-black as adult males, however, and their subadults are therefore somewhat more difficult to identify. This must be kept in mind when assessing the measurements of specimens presented, there being greater variation in the tail length of females, as younger birds have shorter (*P. carunculata*) or longer (*P. brevicauda*) tails than their respective adults.

## Results

Table 1 presents a summary of mean measurements of paradigalla specimens for each sex and age class and for the size differences between each sex overall. These results demonstrate that adult male and female *P. carunculata* have a wing length that is on average 15% and 9% and a total tail length 60% and 46% longer than those of *P. brevicauda* respectively. Within each sex and age class these differences are stressed by mostly mutually exclusive ranges in size, conspicuously so in the wing, tail and tarsus lengths of adult males.

TABLE 1
Measurements (mm) of paradigalla skin specimens from various museums

| | Wing | Total tail | Central tail | Tarsus | Bill length | Bill width |
|---|---|---|---|---|---|---|
| ***P. carunculata*** | | | | | | |
| Adult males | 186 | 132 | 160 | 49.0 | 43.1 | 5.3 |
| | 180–201 | 122–137 | 132–170 | 47.9–50.2 | 38.0–44.5 | 4.6–6.7 |
| | 6.06 | 4.38 | 10.60 | 0.77 | 2.31 | 0.68 |
| | 10 | 10 | 10 | 9 | 8 | 9 |
| Subadult male | 178 | 125 | 137 | 49.4 | 43.2 | 5.5 |
| Immature males | 170 | 124 | 133 | 47.7 | 43.8 | 5.7 |
| | 160–179 | 115–130 | 121–148 | 44.4–49.8 | 42.4–44.5 | 5.2–6.4 |
| | 7.25 | 7.00 | 10.03 | 2.35 | 0.80 | 0.39 |
| | 6 | 6 | 6 | 6 | 6 | 6 |
| Total males | **180** | 128 | 149 | 48.5 | 43.4 | 4.4 |
| Adult females | 165 | 125 | 132 | 45.6 | 42.2 | 6.0 |
| | 157–175 | 118–131 | 125–138 | 41.4–50.2 | 39.0–44.0 | 5.2–6.4 |
| | 6.6 | 5.78 | 4.71 | 2.92 | 1.57 | 0.41 |
| | 11 | 9 | 9 | 11 | 10 | 9 |
| ***P. intermedia*** | | | | | | |
| Males | **160** | 99 | 91 | 42 | 43.7 | 5.9 |
| | 155–164 | 94–107 | 75–106 | 41.6–43.0 | 43.0–44.4 | 5.4–6.1 |
| | 4.58 | 7.23 | 15.52 | 0.72 | 0.70 | 0.40 |
| | 3 | 3 | 3 | 3 | 3 | 3 |
| ***P. brevicauda*** | | | | | | |
| Adult males | 158 | 53 | 51 | 44.0 | 44.2 | 5.6 |
| | 151–168 | 44–88 | 42–73 | 41.5–45.6 | 39.6–48.9 | 4.9–6.2 |
| | 4.45 | 8.85 | 6.99 | 0.99 | 0.93 | 0.40 |
| | 25 | 25 | 24 | 25 | 23 | 25 |
| Subadult males | 159 | 68 | 65 | 43.5 | 43.1 | 5.6 |
| | 156–163 | 56–88 | 59–70 | 41.1–44.5 | 40.1–45.3 | 5.4–5.7 |
| | 3.30 | 17.21 | 7.78 | 1.60 | 2.69 | 0.14 |
| | 4 | 3 | 2 | 4 | 3 | 4 |
| Immature males | 158 | 76 | 77 | 43.3 | 44.4 | 5.8 |
| | 148–164 | 54–97 | 53–96 | 38.8–46.3 | 40.6–48.0 | 5.2–6.6 |
| | 3.71 | 14.86 | 13.97 | 1.67 | 2.15 | 0.34 |
| | 23 | 23 | 21 | 23 | 20 | 23 |
| Total males | **158** | 64 | 63 | 43.7 | 45.1 | 5.7 |
| Adult females | 150 | 68 | 67 | 41.9 | 44.4 | 5.9 |
| | 144–154 | 46–96 | 53–91 | 39.1–43.9 | 42.1–47.9 | 5.2–6.5 |
| | 2.96 | 15.48 | 12.78 | 1.09 | 1.49 | 0.35 |
| | 26 | 26 | 23 | 26 | 25 | 25 |
| Immature females | 153 | 89 | 78 | 42.4 | 44.7 | 6.3 |
| | 152–153 | 85–93 | 67–89 | 41.8–43.0 | 44.1–45.2 | 6.3–6.3 |
| | 0.71 | 5.66 | 15.56 | 0.85 | 0.78 | 0 |
| | 2 | 2 | 2 | 2 | 2 | 2 |
| Total females | 150 | 69 | 67.8 | 41.9 | 44.4 | 5.9 |

*Note*: Figures for each age class are (top to bottom) mean, range, SD and sample size.

For adult males and females the average total tail length as a percentage of wing length is 71% and 76% respectively in *P. carunculata* and only 34% and 45% respectively in *P. brevicauda*, while the tarsus length as a percentage of wing length is nearly the same (*c.* 27%) in both species.

On average, adult male *P. carunculata* have a wing 11% longer than their adult females whereas wing length of adult male *P. brevicauda* is only 5% longer than that of adult females of their species. Average overall tail length of adult male *P. carunculata* is 5% longer than of females, whereas that of adult male *P. brevicauda* is, to the contrary, 22% shorter than that of females. In both sexes and all age classes of *P. carunculata* the central pair of tail feathers are on average 11% longer than the remainder of the tail whereas in *P. brevicauda* the central tail feathers are 4% shorter than the rest of the tail. Relative to its much larger body size, *P. carunculata* has a proportionately smaller bill than *P. brevicauda* (Table 1).

One other noteworthy biometric result is that in *P. carunculata* younger individuals have a shorter and less graduated tail than adults (*contra* Ogilvie-Grant 1913, 1915 & Gyldenstolpe 1955) whereas in *P. brevicauda* younger birds have a considerably longer tail than adults. Thus the two paradigalla species are distinctly different in size, relative proportions and in sexual dimorphism of these characters (*contra* Gilliard 1969, Cooper & Forshaw 1977 for the most part).

The three immature to adult specimens of supposed *intermedia* are all sexed as male. Of these the BMNH holotype (1916.5.30.1072) is subadult and the paratype (1916.5.30.1073) is immature. The third, Yale specimen (75320), recorded by Ripley (1964), has black adult plumage. Its total tail length of 107 mm is (8 mm) shorter than shortest-tailed adult male *P. carunculata* and (10 mm) longer than longest-tailed adult male *P. brevicauda*. Total tail lengths of the other two *intermedia* specimens are 95 and 94 mm, which fall within the range of that of young male *P. brevicauda* and are far (20 mm) shorter than those of male *P. carunculata* of any age.

Table 1 demonstrates that in young male *P. brevicauda* the central rectrices may be longer than the rest of the tail, and in several immatures we found them to be up to 5 or 6 mm longer than all other tail feathers. A shorter pair of central tail feathers notwithstanding, the overall shape of undoubted *P. brevicauda* individuals may be graduated. For example, the lengths of individual tail feathers, from the central to the outermost, were 95, 97, 97, 95, 88, 79 in BMNH immature/subadult male 1949.62.22 from Tomba, Papua New Guinea. This is a more distinctly graduated tail than is that of the type specimen of *intermedia*, which measures 75, 95, 94, 93, 87, 81 respectively.

In the BMNH holotype the central pair of tail feathers are the only jet-black ones of adult plumage and, being unsheathed and evidently fully grown (*contra* Ripley 1964), are shorter (75 mm) than the rest of the tail (95 mm) which is only slightly rounded, or graduated. Thus this bird would have acquired the shorter tail of *P. brevicauda* with its subsequent moult. Its slightly graduated tail, which would probably have become even more truncate with the subsequent moult, is

identical to that of several undoubted subadult male *P. brevicauda* (e.g. BMNH 1969.41.806) from Mt. Kunupi in the central cordillera of Irian Jaya.

No specimens of *intermedia* show any sign of the additional bare orange-red area of skin (of *P. carunculata*) beneath the blue lower mandible wattle. Noteworthy too is that the colours of facial bare parts were not recorded for the holotype of *intermedia*. These are noted on the label of the paratype, however, as "nasal flaps base of bill lemon-yellow". In both of these specimens, however, the dried upper facial wattles are now a mustard-yellow while the lower ones are contrastingly blackish. Of the third *intermedia* specimen, at Yale, Ripley (1964) recorded all facial wattles of the freshly dead bird as clear lemon yellow. While describing this individual as an adult male, Ripley recorded on its label that its gonads were unenlarged at a time (10 September) when an adult might be expected to be in breeding condition. The tail of the latter specimen is graduated but that of the holotype and paratype is barely so, being merely slightly 'rounded' (see Discussion).

A point requiring clarification here relates to the unsexed nestling (BMNH 1916.5.30.1074) taken with its nest at the Utakwa River in conjunction with the collection of type material of *intermedia*. Vague wording by some authors subsequent to Ogilvie-Grant (1913, 1915) may give the impression that the male holotype or paratype of *intermedia* was collected with the nestling and nest. In fact the nestling was collected at Camp 9 on 27 January and the two male birds at Camp 6c on 24–25 February. Moreover, in view of what we now know about the nesting biology of *P. brevicauda*, and the fact that *P. carunculata* appears to have been a putative parent of hybrids involving other bird of paradise species, it would seem most unlikely that male *P. "intermedia"* would attend nests (Frith & Frith 1992).

The distributions of paradigalla taxa, derived from an examination of specimens and the literature, shown in Figure 1 demonstrate that *P. carunculata* is confined to the Arfak Mountains of the eastern Vogelkop proper. The species *P. brevicauda* is recorded from the central mountain ranges of New Guinea from the Mt. Wilhelm and Mt. Karimui area of Papua New Guinea westward to the Wissel lakes area, Weyland Mountains of Irian Jaya.

## Discussion

It might be thought that the three male *intermedia* skins reflect a tendency for males of *P. brevicauda* to have longer tails at the western limits of the species range (Fig. 1). This is not the case, however, as six birds further to the west, on the Weyland Mountains, have the typically short tail of *P. brevicauda*. These specimens, AMNH 0049951, 302983, 678340, 678348, 302981 and 678347, have tail lengths of 44, 45, 45, 49, 51 and 52 mm respectively, all shorter than the average adult male *P. brevicauda* tail length (Table 1). Accordingly, we consider the three specimens of free-flying *"intermedia"* to be relatively young, and therefore long-tailed, individuals of *P. brevicauda* of which only one has

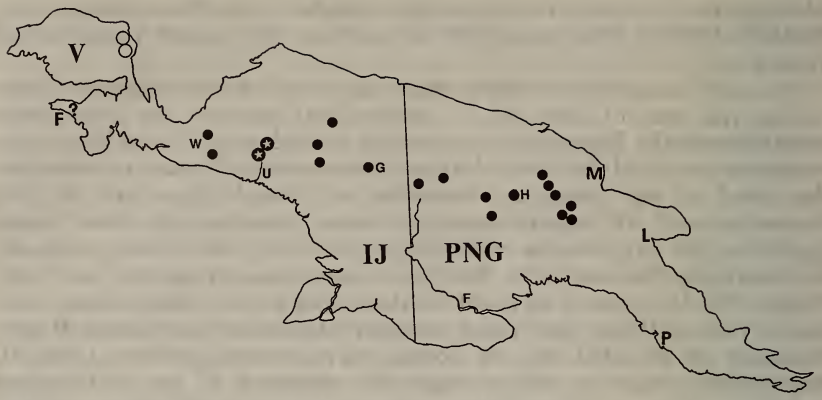


Figure 1. Map of mainland New Guinea showing the border between Irian Jaya (IJ) and Papua New Guinea (PNG) and the distribution of the two *Paradigalla* species based on collected specimens and published field sightings that are considered reliable. Note: Solid circles=*P. brevicauda*; circles with stars within=*P. (intermedia) brevicauda*; open circles=*P. carunculata*; ?=*P. sp.* sighted in Fakfak Mountains (see text). Note: a single circle may encompass several collecting locations. Locations of some key features are indicated by (left to right): V=Vogelkop; large F=Fakfak; W=Weyland Mts.; U=Utakwa River; G=Mt. Goliath; F=Fly River; H=Mt. Hagen; M=Madang; L=Lae; P=Port Moresby.

a tail length (see below) greater than recorded in that species (Table 1). In particular the central tail feather length of the holotype of *intermedia* (75 mm) is far more compatible with that of *P. brevicauda* than with *P. carunculata* (Table 1). Moreover, we are able to confirm Mayr & Gilliard's (1954) comment that specimens of *P. brevicauda* from the extreme eastern part of the species range (Mt. Hagen and Bismarck Range) are indistinguishable from those from the extreme west (Weyland Mountains).

Given that we found that the dried upper facial wattles (lemon yellow in life) were a mustard-yellow but the lower ones (blue in life) were blackish in all skins of adult *P. brevicauda*, the differences in wattle colours of live birds are clearly reflected in dried skins. That the upper wattle was mustard-yellow and the lower one blackish in the *intermedia* type material strongly suggests that, if not blue in life, the lower wattle was to have become so. Two immature BMNH *P. brevicauda* specimens (1949.62.22 and 1969.41.806 from Tomba, Papua New Guinea and Mt. Kunupi, Irian Jaya, respectively) have lower wattles mustard-yellow as their upper ones but with darker blackish pigment apparent along their upper and lower edges and at their posterior end. These immature birds thus appear to suggest that the blue wattle colour only begins to be acquired by advanced immatures or subadults. This is supported by the fact that the dried wattles in the BMNH nestling specimen are pale mustard-yellow throughout, with no sign of dark pigment. A near-fledged large nestling photographed in the wild also had wattles dull lemon yellow throughout (Frith in Coates 1990).

Moreover, Gilliard & LeCroy (1961) described a freshly dead subadult ("virtually adult") male collected at Mt. Ifal, Victor Emanuel Mountains as having the upper facial wattle bright lime yellow and the lower 'gape' wattle "dull yellowish grey, with black contour lines below". The latter feature matches the condition noted in a nestling and in dried specimens of *P. brevicauda* we consider to be subadults as detailed above. Thus, the supposed distinctive character of an all-yellow facial and bill wattle cannot be accepted as taxonomically diagnostic of *intermedia*, as it occurs in young and subadult *P. brevicauda*. We consider it quite possible that young *P. carunculata* will also lack blue colour in the lower mandible wattle. The additional area of distinctly orange-red bare skin beneath the base of the blue wattle of *P. carunculata* appears diagnostic of the species, although this area has been described as bare but yellow in a single freshly dead adult male *P. brevicauda* on Mt. Ifal, Victor Emanuel Mountains (Gilliard & LeCroy 1961).

In attributing his Ilaga Valley specimen to *P. c. intermedia*, Ripley (1964) supported his case by presuming that the shorter central tail feather pair of the holotype of *intermedia* must have been "not fully moulted out"; but these feathers are in fact fully grown in that specimen. Ripley also made much of the fact that the tail of his own specimen "has the normal wedge shape of *carunculata*, the central rectrices being the longest". Our measuring of this specimen, however, gave a total tail length of 107 mm, with the central pair of rectrices one millimetre shorter at 106 mm. All three *intermedia* specimens in fact have the central pair of rectrices shortest whereas in all male (adult and immature) *P. carunculata* specimens ($n$=16) the central pair are conspicuously longest. The tail lengths of the two BMNH specimens of *intermedia* (94 and 95 mm) fall within the range of younger male *P. brevicauda* (Table 1) but that of Ripley's specimen (107 mm) is longer than any male *P. brevicauda* but shorter than any *P. carunculata*. Notwithstanding the black adult-like plumage of Ripley's specimen, we interpret its exclusively yellow wattles and its just shortest central rectrices as indicative of a relatively young individual *P. brevicauda* in first adult plumage retaining the longer (longest known) tail typical of immaturity. That Ripley's bird had unenlarged gonads on 10 September permits the possibility it is in fact a less than fully sexually mature *P. brevicauda* which could account for its long tail (see above). That it had a graduated tail, moreover, does not exclude it from *P. brevicauda* as individuals of the latter are known with graduated tails (see Results). Significantly, the wing length of Ripley's specimen (155 mm) is not intermediate between that of *P. carunculata* and *P. brevicauda* but is shorter than all *P. carunculata* specimens ($n$=28) and is in fact short for male *P. brevicauda* (Table 1).

The above facts show that, in general size and shape, the specimens of supposed *intermedia* are in fact far closer to *P. brevicauda* than to *P. carunculata*, as emphasised by Mathews (1930) and Mayr (1941, 1962). In addition, the supposed diagnostically yellow lower wattle of *intermedia* is shown here to be characteristic of immature/subadult *P. brevicauda* and probably also *P. carunculata*; and this correlates with

a longer tail in younger birds. Contrary to *P. brevicauda*, immatures of *P. carunculata* have a shorter tail than adults (*contra* Gyldenstolpe 1955: 135). For these reasons, and the fact that "*intermedia*" is known only from *within* the geographic range of *brevicauda*, not outside and adjacent to *carunculata* (Fig. 1), the taxon *intermedia* should be considered invalid.

In overall and proportionate wing and tail lengths, which differ sexually from *P. brevicauda*, the Arfak paradigalla is most distinct. On these characters alone *P. carunculata* and *P. brevicauda* may be judged good species, particularly as we found no clinal trend towards longer tails in western populations of *P. brevicauda*. Until such time as convincing evidence suggests otherwise, the four birds presently known as *intermedia* should be considered as representing immature and/or subadult individuals of monotypic *P. brevicauda*. The recent resurrection of *P. intermedia* as a full species (Cracraft 1992), confined to the Carstensz Peak type locality area entirely within the extensive range of typical *P. brevicauda* populations, is zoogeographically questionable, quite aside from the strongly contradictory morphological and biometrical evidence presented here.

*P. carunculata*, as far as is known, is endemic to the Arfak Mountains, with a congeneric representative elsewhere on the core cordilleras of New Guinea, as in several other west Irian Jayan montane species such as the Vogelkop Scrub-wren *Sericornis rufescens*, Grey-banded Mannikin *Lonchura vana*, Vogelkop Bowerbird *Amblyornis inornatus*, Arfak Astrapia *Astrapia nigra* and Western Parotia *Parotia sefilata* (Beehler *et al.* 1986).

The identity of two paradigallas sighted in the Fakfak Mountains, Bomberai Peninsula, with pale yellow upper and blue lower facial wattles, without any orange-red skin, and square-tipped short tails remains problematical (Gibbs 1994). On zoogeographical grounds, the Fakfak birds would appear most likely to be of *P. carunculata* stock (Beehler *et al.* 1986). While a markedly short and square-ended tail as described would suggest *P. brevicauda* (see Table 1), the drawing published by Gibbs could be of relatively short-tailed individuals of *P. carunculata*. If the birds seen by Gibbs were in fact *P. carunculata*, they would most probably have been young females, given their relatively short tails (Table 1). Because Gibbs (1994) also presents evidence suggesting that at least two or three distinctly new and unknown forms of passerines apparently await formal discovery and description from that region, the collection of paradigallas there is needed urgently.

**Summary**

The New Guinea montane genus *Paradigalla* (Paradisaeidae) is reviewed, based on an examination of most specimens in major world museums, and the literature. One hundred and fifty specimens were measured; their biometrics are presented and discussed, and their locations are mapped and presented. Only two taxa are accepted: larger and longer-tailed *P. carunculata* confined to the Arfak Mountains of the Vogelkop, Irian Jaya, in which adults have yellow, blue and red facial wattles and young birds a tail shorter than adults; and smaller and shorter-tailed *P. brevicauda* throughout mountains of the main trunk of New Guinea, in which adults lack the red facial wattle and young

birds have a tail longer than adults. The four known specimens of *P. c. intermedia* were found to show no distinctive characters and on morphological, biometrical and zoogeographical evidence are interpreted as relatively young individuals of monotypic *P. brevicauda*.

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# Swamp warblers *Acrocephalus gracilirostris* and *A. rufescens* at Lake Chad, Nigeria

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This paper aims to clarify the status of two swamp warblers at Lake Chad, the Lesser Swamp Warbler *Acrocephalus gracilirostris* and the Greater Swamp Warbler *A. rufescens*.

While living at Malamfatori (13°37'N, 13°20'E) on the Nigerian shore of Lake Chad during 1968, R.J.D. noted *A. gracilirostris* in song from the time of his arrival at the end of February. This species